CHARACTERIZATION OF THERMOPHOTOVOLTAIC CELLS

By Dale R. Burger **and Robert L. Mueller**
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

ABSTRACT - Thermophotovoltaic (TPV) research has reached a period of rapid expansion after 30 years of effort yet there is still no comprehensive method of TPV cell characterization. To support this surge in research, the Jet Propulsion Laboratory has developed many necessary procedures for TPV cell characterization. This low-cost, pioneering effort was made possible by utilizing or modifying available equipment. Simple procedures allow the derivation of temperature coefficients for Voc and Isc as well as the intensity coefficient for Voc. Specific standard spectrums are used while both the source intensity and the cell temperature are adjusted. Measurements of cell external spectral response and dark forward and reverse diode current are used to further characterize the cell. Standard operating conditions of spectrum, intensity and cell temperature are proposed so that TPV cell performance and efficiency data will be universally accepted for cell comparison. Examples of TPV cell data are illustrated and a description of test apparatus is also presented. This cell characterization effort permits modelling the performance of a TPV cell in a total TPV system. In addition to system modelling, cell design and TPV cell material development efforts are also supported.